What is the Best Site for Measuring the Pleth Variability Index (PVI) during a Surgery Procedure?

Pavlakovitch I., Desebbe O., Cannesson M., Bastien O., Lehot J.J. *Eur J Anaesthesiol.*, 2011; May:Abs 1306.

Background

The PVI (Masimo Corp) is a noninvahttp://www.abstractserver.com/esa2011/planner/index.php?go=abstract&action=abstract_iplanner&absno=1306&ESA2011=4f4jrl1oicgpogg5s4ucmilg01&ESA2011=4f4jrl1oicgpogg5s4ucmilg01sive and continuous monitoring of fluid responsiveness in mechanically ventilated patients. The PVI is derived from the respiratory variations in the perfusion index (PI) measured from the photoplethysmographic waveform. The PVI has been evaluated only in steady state conditions and from the finger site. However, the cephalic region seems to allow better detection of the respiratory signal within the plethysmographic waveform than the finger and seems to be less sensitive to sympathetic tone. The goal of our study was to evaluate three different sites for PVI measurement (ear, forehead, and finger) and to test their ability to detect a pulse pressure variation (PPV) > 10% during ongoing surgery.

Method

Sixteen patients were studied during abdominal aortic aneurysm. Hemodynamic data, PPV (automatically and continuously displayed on Philips Monitors) and PVI at three sites (forehead, ear and finger) were recorded at 5 different steps (after induction, after incision, after aortic clamping, before and after aortic declamping). Pulse oximeter sensors (LNOP Adt, Masimo Corp) attached to the forehead, ear and finger were connected to a monitor (Radical-7, Masimo Corp). PVI calculates the respiratory variations in the plethysmographic waveform amplitude as: $PVI = (PImax-PImin)/PImax$ where PImax and PImin are the maximum and the minimum Perfusion Index values over a given period of time; PVI is averaged over 2 minutes.

Results

The PVI was correlated with the PPV (r=0.43 for PVIfinger with p< 0.001; r=0.60 for PVIforehead with p < 0.001; r=0.72 for PVIear with p< 0.001). A PVIforehead > 14% and a PVIear > 15% predicted a PPV > 10% with a sensitivity of 73% and a specificity of 72%.

Conclusion

Ear and forehead seems to provide the best accuracy for PVI determination compared to the finger. This observation may be related to a smaller vasomotor tone at these sites than at the finger.

	area	p	cutoff	sensitivity (%)	specificity (%)
PVIforehead	0.742	<0.001	14%	73	72
PVIear	0.732	<0.001	15%	73	72
PVIfinger	0.61	0.1	13%	78	44

[Area under the curve for PVI to predict a PPV>10%]